

WHAT IS CLAIMED IS:

1. A surface acoustic wave device comprising:
a piezoelectric substrate on which resonators
5 having comb-like electrodes are formed; and
a silicon substrate that is directly bonded to
the piezoelectric substrate and is less expansive than
the piezoelectric substrate,
a cavity being formed in the silicon substrate
10 and being located below at least one of the resonators.
2. The surface acoustic wave device as claimed
in claim 1, wherein said one of the resonators has
reflector electrodes close to the comb-like electrodes
15 thereof, and the cavity is located below the comb-like
electrodes and the reflector electrodes.
3. The surface acoustic wave device as claimed
in claim 1, wherein the cavity is formed in the silicon
20 substrate and is located below only an area that
includes the comb-like electrodes.
4. The surface acoustic wave device as claimed
in claim 1, wherein the piezoelectric substrate has a
25 rough surface that is exposed through the cavity.
5. The surface acoustic wave device as claimed
in claim 1, further comprising an acoustic absorption
member provided on a surface portion of the
30 piezoelectric substrate exposed through the cavity.
6. The surface acoustic wave device as claimed
in claim 1, wherein cavities are formed in the silicon
substrate and are located below only some comb-like
35 electrodes.
7. The surface acoustic wave device according

to claim 1, wherein the piezoelectric substrate is made of one of lithium tantalate and lithium niobate.

8. A surface acoustic wave device comprising:
5 a piezoelectric substrate on which resonators having comb-like electrodes are formed; and
a silicon substrate that is directly bonded to the piezoelectric substrate and is less expansive than the piezoelectric substrate,
10 the silicon substrate having a resistivity equal to or greater than $10 \Omega \cdot \text{cm}$.

9. A surface acoustic wave device comprising:
a piezoelectric substrate on which resonators
15 having comb-like electrodes are formed; and
a silicon substrate that is directly bonded to the piezoelectric substrate and is less expansive than the piezoelectric substrate,
the resonators being located at a distance d from
20 ends of the device in a direction in which a surface acoustic wave propagates,
the distance d satisfying $d \geq 3t_p$ where t_p is a thickness of the piezoelectric substrate.

25 10. The surface acoustic wave device as claimed in claim 1, further comprising electrode pads provided on the piezoelectric substrate and electrically coupled to the resonators.

30 11. A method of fabricating a surface acoustic wave device comprising the steps of:
directly bonding a piezoelectric substrate on which resonators having comb-like electrodes are formed, and a silicon substrate that is directly bonded to the
35 piezoelectric substrate and is less expansive than the piezoelectric substrate; and
forming a cavity in the silicon substrate so that

the cavity is located below at least one of the resonators.

12. The method as claimed in claim 11, wherein
5 said one of the resonators has reflector electrodes close to the comb-like electrodes thereof, and the step of forming a cavity forms the cavity that is located below the comb-like electrodes and the reflector electrodes.

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13. The method as claimed in claim 11, further comprising a step of making a surface portion of the piezoelectric substrate exposed through the cavity rough.

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14. The method as claimed in claim 11, further comprising a step of providing an acoustic absorption member on a surface portion of the piezoelectric substrate exposed through the cavity.

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15. The method as claimed in claim 11, wherein the step of forming a cavity comprises a step of forming a plurality of cavities located below only some resonators.

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16. The method as claimed in claim 11, wherein the step of forming a cavity comprises a step of etching the silicon substrate from a first side thereof opposite to a second side thereof on which the
30 piezoelectric substrate is provided.

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17. The method as claimed in claim 11, wherein the step of forming a cavity etches the silicon substrate by RIE.

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18. The method as claimed in claim 11, wherein the piezoelectric substrate is made of one of lithium

tantalate and lithium niobate.

19. A method of fabricating a surface acoustic wave device comprising the steps of:

5 directly bonding a piezoelectric substrate and a substrate that is less expansive than the piezoelectric substrate; and

forming resonators on the piezoelectric substrate so as to be located at a distance d from ends of the
10 device in a direction in which a surface acoustic wave propagates,

the distance d satisfying $d \geq 3t_p$ where t_p is a thickness of the piezoelectric substrate.

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